

CLAIMS

1. Field asymmetric ion mobility spectrometer apparatus, comprising
a sample preparation and introduction section, including a head for delivery of ions from a sample, and
5 an ion filtering section, an output part and an electronics part,
said filter section comprising surfaces defining a flow path, further comprising ion filter electrodes facing each other over said flow path, said flow path for the flow of ions between said electrodes, said ions derived from said sample,
said electronics part configured to apply controlling signals to said electrodes,
10 said electronics part applying a signal across said electrodes for generating a filter field having a condition for filtering the flow of said ions in said flow path according to said conditions, and said filter field being compensated to pass desired ion species out of said filter, said passed desired species flowing along said flow path to said output part.
- 15 2. Apparatus of claim 1 wherein said sample is in liquid state.
3. Apparatus of claim 1 wherein said signal is varying and asymmetric and said surfaces are insulating.
- 20 4. Apparatus of claim 1 wherein said varying signal is periodic and asymmetric and said surfaces are insulating.
5. Apparatus of claim 1 wherein said field condition are varying and alternate between a high and low levels and said surfaces are insulating.

6. A system for sample separation, comprising:
- means for sample preparation and introduction via a head for delivery of ions from a liquid sample,
- means for filtering said ions via an ion filtering section,
- 5 means for providing said filter section with supporting surfaces defining a flow path and supporting ion filter electrodes facing each other over said flow path, said flow path for the flow of said ions between said electrodes, said ions derived from said liquid sample,
- means for providing an electronics part configured to apply controlling signals
- 10 to said electrodes, said electronics part further comprising means for applying an asymmetric periodic signal across said electrodes for generating a filter field having alternating high and low level condition for filtering the flow of said ions in said flow path according to said alternating conditions, and said filter field being compensated to pass desired ion species out of said filter, said passed desired species flowing along said
- 15 flow path to an output part.
7. System of claim 6 further comprising means for forming said supporting surfaces as insulating substrates, and means for controlling the gap between said filter electrodes with said substrates in cooperation.
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8. System of claim 7 further comprising means for providing a planar filter with insulating spacers associated with said substrates.
9. System of claim 6 further wherein said head comprises an electrospray means for
- 25 creating ions.

10. System of claim 6 further comprising desolvation means for performing desolvation on said ions.
11. System of claim 10 further comprising means for applying symmetric RF
5 signals to said desolvation means for enhancing said desolvation.
12. A field asymmetric ion mobility spectrometer system, comprising:
means for providing a sample ion source, an ion filtering section, an output part,
means for providing insulating surfaces in said filter section defining a flow path
10 with filter electrodes facing each other over said flow path, said flow path for the flow of ions between said electrodes, said ions derived from said sample source,
means for providing an electronics part configured to apply controlling signals to said electrodes and generating, said electronics part further comprising means for applying an asymmetric periodic signal across said electrodes for generating a filter
15 field having alternating high and low level condition for filtering the flow of said ions in said flow path according to said alternating conditions, and said filter field being compensated to pass desired ion species out of said filter, said passed desired species flowing along said flow path to said output part, and
means for defining a plurality of integrated micro-fluidics heads with filter parts
20 in a housing, said housing fixing the relative positions of the micro-fluidic heads and filter parts.
13. A field asymmetric ion mobility spectrometer system with a sample preparation and introduction section, ion filtering section, and an output and control section,
25 comprising means for providing insulating surfaces, means for forming said filter section comprising ion filter electrodes facing each other on said insulating surfaces, means for performing ion filtering after sample ionization, means for separating bio-

molecules of interest in a compensated high-low varying asymmetric RF field, and means for identifying said bio-molecules based on differences in their ion mobility in high and low varying compensative RF field.

5 14. A field asymmetric ion mobility spectrometer system, comprising:

means for providing a sample preparation and introduction section, including a head for delivery of ions from a liquid sample,

means for providing an ion filtering section and an output part,

10 means for providing said filter section with insulating surfaces defining a flow path with ion filter electrodes facing each other over said flow path, said flow path for the flow of ions between said electrodes, said ions derived from said liquid sample,

15 means for providing an electronics part configured to apply controlling signals to said electrodes, said electronics part applying an asymmetric periodic signal to said electrodes for generating a filter field having alternating high and low level condition for filtering the flow of said ions in said flow path according to said alternating conditions, and said filter field being compensated to pass desired ion species out of said filter, said passed desired species flowing along said flow path to said output part, and

20 means for providing a compensation control input for the control of a feature of said field to provide said compensation.